Engineering Tripos Part IIA Project, GA4: Heat Pump, 2020-21

Leader

Dr A J White [1]

Timing and Structure

Fridays 11-1pm, Tuesdays 9-11am plus afternoons

Prerequisites

3A5 useful

Aims

The aims of the course are to:

- To critically assess the value of heat pump technology as a way of reducing emissions of CO2.
- To design an experiment to measure the performance of the heat pump, and to make measurements which allow its performance to be modelled.
- To produce a model of the heat pump which is validated against the experimental measurements.

Content

This project looks at the performance of a commercially available heat pump for domestic heating applications. Students will be required to designb and perform an experiment to measure the performance of the heat pump, and build a model of the heat pump. This model will be used to explore the CO2 saving which could be made by using heat pumps in a domestic heating application. Students will work in groups of 4 to design and perform the experiment. Individual tasks may be distributed amongst group members as decided by the group. Individual reports are required from group members, as well as group reports.

Week 1

Familiarisation with the equipment. Construction of a simple python model of the heat pump. Design of the experiment. First interim (group) report and review meeting (20%).

Week 2

As a group, refine experimental plan, adjust logging software and make measurements on the performance of the heat pump using an external water circuit. Individually: finish writing simple python model of a heat pump and prepare an individual report thereon (20%).

Week 3

Complete experimental work, including measurements on the internal (refrigeration) circuit. Make comparisons with the python model.

Week 4

Measurements of availability loss within the heat pump and refinement / extension of python model. Assessment of

carbon saving. Final individual report (60%) with up to one third of the report (20% overall) devoted to group activity.

Coursework

Coursework	Due date	Marks
Interim Report 1 (group)	4pm Friday 15 May 2020 (review meeting Tuesday 12 May, PM session)	16 (group)
Interim Report 2 (individual)	4pm Friday 22 May 2020	16 (individual)
Final Report (individual with group component)	4pm Friday 5 June 2020	48 (individual)

Examination Guidelines

Please refer to Form & conduct of the examinations [2].

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Links
[1] mailto:ajw36@cam.ac.uk
[2] https://teaching22-23.eng.cam.ac.uk/content/form-conduct-examinations